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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/752,534	12/29/2000	Manoj Khare	42390P9878	1416

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EXAMINER

PATEL, HETUL B

ART UNIT

PAPER NUMBER

2186

DATE MAILED: 01/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/752,534	Applicant(s) KHARE ET AL.	
	Examiner Hetul Patel	Art Unit 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,27,29-33,35-39 and 41-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,27,29-33,35-39 and 41-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is responsive to communication filed on December 20, 2004. This amendment has been entered and carefully considered. Claims 28, 34 and 40 are cancelled; and claims 1, 27, 29-33, 35-39 and 41-43 are presented again for examination.
2. Applicant's arguments filed on December 20, 2004 have been fully considered but they are not deemed to be persuasive.
3. The rejection of claims 1, 27, 29-33, 35-39 and 41-43 as in the Office Action mailed August 18, 2004 is respectfully maintained and reiterated below for Applicant's convenience.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 27, 29, 31-33, 35, 37-39, 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. (USPN: 6,598,123), hereinafter, Anderson, in view of Witt (USPN: 5,623,627).

As per claims 1 and 32, Anderson teaches a method and a machine-readable medium that is used in multi-processor system (1 in Fig. 1) comprising a snoop filter (5

in Fig. 1 and 20 in Fig. 2). Furthermore, Anderson teaches that the snoop filter is used to maintain the cache coherency state information for each cache line (e.g. see Col. 1, lines 14-33). However, Anderson does not teach that the method and the machine-readable medium having instructions, which when executed by a machine generates result, comprises steps of determining if the state of the line is an ambiguous state and resolving the ambiguous state by writing one of the contents and the modified contents to the requesting node if the contents have been modified. Witt, on the other hand, teaches that

- in response to a request from a requesting node of a plurality of caching nodes to access contents of a cache line, determining if a state of the cache line is an ambiguous state (e.g. see column 11, lines 4-5). As per definition of an ambiguous state given in the specification of this application, “an ambiguous state is a condition that identifies the last known state of the cache line at a member node that could have changed since last identified state”. According to this definition, when the last known state of the member node is shared state and if the shared data is modified at some other shared node, then the member node turns into ambiguous state; and
- if the state is an ambiguous state, resolving the ambiguous state by determining if the contents have been modified, and writing one of the contents and the modified contents to the requesting node (e.g. see column 11, lines 5-9).

Accordingly, It would have been obvious to one of ordinary skill in the art at the time of the current invention was made to modify the method and the machine-readable medium disclosed by Anderson, by adding two steps, determining and resolving the ambiguous state upon request to access the contents, as taught by Witt. In doing so, every modification made to the data on other/neighbor node will be broadcasted to other nodes and the main memory and therefore, data coherency is guaranteed and maintained throughout the system.

As per claim 38, Anderson teaches a shared memory multiprocessor system (1 in Fig. 1) comprising:

- a plurality of caching nodes (2 of Fig. 1), including a requesting node and a responding node; and
- a scalability port switch (10 in Fig. 1) having a snoop filter (5 in Fig. 1), the snoop filter having a plurality of caches (22 in Fig. 2) to maintain information about the state of each cache line at the plurality of caching nodes (e.g. see Col. 3, lines 23-32).

However, Anderson does not teach that the scalability port switch capable of steps of determining if the state of the line is an ambiguous state and resolving the ambiguous state by writing one of the contents and the modified contents to the requesting node if the contents have been modified. Witt, on the other hand, teaches that

- in response to a request from the requesting node to access contents of cache line, determining if a state of the cache line is ambiguous state (e.g.

see column 11, lines 4-5). As per definition of an ambiguous state given in the specification of this application, "an ambiguous state is a condition that identifies the last known state of the cache line at a member node that could have changed since last identified state". According to this definition, when the last known state of the member node is shared state and if the shared data is modified at some other shared node, then the member node turns into ambiguous state; and

- if the state is an ambiguous state, resolving the ambiguous state by determining if the contents have been modified, and writing one of the contents and the modified contents to the requesting node (e.g. see column 11, lines 5-9).

Accordingly, It would have been obvious to one of ordinary skill in the art at the time of the current invention was made to modify the shared memory multiprocessor system taught by Anderson, by adding two steps, determining and resolving the ambiguous state upon request to access the contents, as taught by Witt. In doing so, every modification made to the data on other/neighbor node will be broadcasted to other nodes and the main memory and therefore, data coherency is guaranteed and maintained throughout the system.

As per claims 27, 33 and 39, the combination of Anderson and Witt teaches the claimed invention as described above and furthermore, Anderson teaches the method, system and memory-readable medium wherein the snoop filter (20 in Fig. 2) additionally maintains a presence vector (33 in Fig. 3) having one bit for each of the plurality of

caching nodes, the presence vector to indicate that a given caching node of the plurality of caching nodes has a copy of the contents (e.g. see Col. 2, line 59 – Col. 3, line 3; Col. 3, lines 45-47 and Figs. 2-3).

As per claims 29, 35 and 41, the combination of Anderson and Witt teaches the claimed invention as described above. The steps of maintaining the current status of the cache line at the responding node, and the determining whether the contents of the cache line is modified or not by snooping the responding node, occurs in the multiprocessor system with MESI protocol, which is well-known and notorious old in the art. By performing these steps, data coherency is guaranteed and maintained throughout the system. The common knowledge or well-known in the art statement is taken to be admitted prior art because applicant failed to traverse the examiner's assertion of official notice made in the previous Office Action (see MPEP 2144.03 (C)).

As per claims 31, 37 and 43, the combination of Anderson and Witt teaches the claimed invention as described above and furthermore, Anderson teaches the method, system and memory-readable medium wherein each of the plurality of caching nodes implements a Modified, Exclusive, Shared and Invalid (MESI) protocol (e.g. see Col. 3, lines 38-42).

5. Claims 30, 36 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. (USPN: 6,598,123), hereinafter, Anderson, in view of Witt (USPN: 5,623,627) further in view of Weber (USPN: 6,631,448).

As per claims 30, 36 and 42, the combination of Anderson and Witt teaches the claimed invention as described above. However, both Anderson and Witt failed to teach that the contents of the cache line are permanently stored at a home node of the plurality of caching nodes, and if the contents have been modified, then the modified contents is written to the home node. Weber, on the other hand, teaches the "writeback" process, which was also very well known in the art at the time of the current invention was made. In the writeback process, the contents of the cache line are permanently stored at a home node (i.e. main memory) of the plurality of caching nodes, and if the contents have been modified, then the modified contents is written to the home node (e.g. see Col. 6, lines 35-40). Accordingly, It would have been obvious to one of ordinary skill in the art at the time of the current invention was made to modify the method, system and memory-readable medium taught by the combination of Anderson and Witt, so the contents of the cache line are permanently stored at a home node of the plurality of caching nodes, and if the contents have been modified, then the modified contents are written to the home node. In doing so, every modification made to the data on other/neighbor node will be broadcasted to other nodes and the main memory (the home node) and therefore, data coherency is guaranteed and maintained throughout the system.

Remarks

6. As to the remark, Applicant asserted:

(a) As per claims 1, 27, 29, 31-33, 35, 37-39, 41 and 43, there is no suggestion or motivation in Anderson or in Witt for modification or combination.

(b) As per claims 30, 36 and 42, there is no suggestion or motivation in Anderson, Witt, or in Webber for modification or combination.

Examiner respectfully traverses Applicant's remark for the following reasons:

With respect to (a) and (b), in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, as described above in the rejection of stated claims, the motivation for combination/modification of teachings of Anderson, Witt, and/or Webber is in the knowledge generally available to one of ordinary skill in the art. Please refer to the rejection shown above for detail.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hetul Patel whose telephone number is 571-272-4184. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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